

### REMARKS

Claims 47-61 and 63-66 remain pending. Claims 56, 58, 60, and 61 have been amended, and Claim 62 has been canceled without prejudice or disclaimer of subject matter. Claims 47, 51, 56, 60, and 66 are independent.

Claims 47-55 and 63 were rejected under 35 U.S.C. 112, second paragraph, as indefinite. The Office Action asserts, with respect to the phrase “a saturation level of each optical amplifier is either substantially the same, or different, depending on the output power of each optical pump”, that it is “unclear what the applicant is claiming.” The Office Action states “[i]f the saturation level can be ‘different or the same’, it would appear that anything would read on this”, and “[, t]he only two choices are that they can be ‘different’ or ‘the same’.”

The Section 112 rejection is respectfully traversed for the following reasons.

According to MPEP 2171, there are two separate requirements of the second paragraph of Section 112:

(A) the claims must set forth the subject matter that applicants regard as their invention; and

(B) the claims must particularly point out and distinctly define the metes and bounds of the subject matter that will be protected by patent grant.

First, the original specification clearly and specifically states that

“there may be a single pump per channel, with the pump power being the same or different for the respective amplifiers. If the pump powers are different, it is understood that the respective amplifiers have different saturation levels.”

See the specification at page 15, lines 9-13.

It is clear in view of the foregoing description in the specification that Applicants regard the subject matter of a saturation level of each optical amplifier being either substantially the same, or different, as being an aspect of their invention.

Accordingly, part (A) of the above standard is satisfied.

Second, it is respectfully submitted that one skilled in the art would readily appreciate in view of the original application that the meaning of the claim language at issue is that an output power level of each amplifier is operated in a saturation mode, and that the output powers of the amplifiers can be the same or different from each other depending on the output power of each pump. In other words, each pump may have an output power that is substantially the same as that of each other pump, or that is different from the other pumps. Also, each pump operates in a saturation mode. Thus, the Examiner's understanding that there are two choices, namely, that the saturation level can be the same or different, is correct. That the Examiner's correctly understands the foregoing claim language's meaning confirms that one skilled in the art would readily appreciate the meaning of that language.

Moreover, the fact that the claim language at issue explicitly recites two conditions of an amplifier's saturated output power, rather than not reciting those conditions at all, hardly renders the subject claims indefinite. Indeed, is the Office Action asserting that the claims would be definite only if they did *not* recite any such conditions?

If so, the Examiner is respectfully requested to explain why claims can be indefinite when they explicitly recite two possible conditions versus not reciting any conditions at all.

Furthermore, the recitation of “same or different” is believed to be entirely proper since MPEP 2173.05(h) II. clearly recognizes that “[a]lternative expressions using ‘or’ are acceptable....”

In view of the foregoing, it is believed that Claims 47-55 and 63 comply fully with the requirements of Section 112, second paragraph, and thus the withdrawal of the Section rejection is respectfully requested.

Claims 47-66 were rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 2-5, 9, 34, and 36 of U.S. Patent No. 6,735,394, which is the parent of the present application.

Without conceding the propriety of this rejection, and merely to obtain early allowance of the claims, a terminal disclaimer is filed herewith, and obviates the foregoing rejection. Accordingly, withdrawal of the rejection is respectfully requested.

Claims 47, 49, 51, 54-61, 63, and 64 were rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,339,495 (*Cowles et al.*) in view of U.S. Patent No. 5,241,414 (*Giles et al.*), and Claim 65 was rejected under 35 U.S.C. 103(a) as being unpatentable over *Cowles* in view of *Giles*, and further in view of U.S. Patent No. 6,515,777 (*Arnold*).

Independent Claim 47 recites:

47. A method of operating at least one optical node, comprising the steps of:

applying optical wavelength signals to inputs of respective ones of a plurality of optical amplifiers; and  
selectively coupling output power of a plurality of optical pumps to selected ones of the optical amplifiers through a coupler, to cause the optical amplifiers to operate in a saturation mode, wherein a saturation level of each optical amplifier is either substantially the same, or different, depending on the output power of each optical pump.

*Cowle et al.* refers to a 1xNxN architecture with multiple parallel power equalization amplifiers (PEAs). According to *Cowle et al.*, each PEA can be designed to operate in its saturation regime so that the output signal power is determined by the pump power and is substantially independent of the input powers (col. 2, lines 8-16). As shown in Fig. 2, a demultiplexer 101 for demultiplexing an optical signal into plural optical signals is provided. Propagation paths 103 are coupled at one end 105 each thereof to demultiplexer 101, and each path 103 includes an optical amplifier 10, with the exception that a pump source 18 is commonly shared among optical amplifiers via pump paths 121A. A multiplexer 107 is coupled to another end 109 of each path.

*Giles et al.* teaches an array of pump light sources operating at a nominal pump wavelength and having their output beams combined and then distributed to produce an array of output pump beams. Each output pump beam is a composite of the output beams of the pump light sources. Each output pump beam includes a predetermined fraction of every output beam from a light source array. *See, e.g.*, col. 2, lines 5-12. *Giles et al.* also teaches a star coupler 13 which accepts optical input signals at its input ports and

combines them in such way that substantially the same composite optical signal appears at the output ports of the coupler. For the coupler shown in Fig. 1, M pump beams are combined in the coupler and then distributed proportionately to each of N output ports so that the composite pump beam at any of the output ports is made up of  $1/N$ th of the optical power of the M combined pumps.

It is respectfully submitted, that even if *Cowle et al.* and *Giles et al.* be deemed to teach the foregoing respective features, nothing has been found, or pointed out, in either reference that would teach or suggest selectively coupling output power of a plurality of optical pumps to selected ones of the optical amplifiers through a coupler, to cause the optical amplifiers to operate in a saturation mode, wherein a saturation level of each optical amplifier is either substantially the same, or different, depending on the output power of each optical pump, as recited in Claim 47.

The Office Action asserts in Section 6 that:

“Although Cowle does not teach specifics about his plural pump means and how they are coupled to the amplifiers, Giles teaches an MXN star coupler similar to the applicant ‘selective’ MXN star means. It would have been obvious to use plural pump means with the MXN star of Giles to couple to plural amplifiers of Cowle in order to improve the reliability of the pump means as taught by Giles et al.”

The foregoing assertion is disagreed with for the following reasons:

In *Giles et al.*, pump laser 11 generates an optical pump beam as a suitable wavelength for producing amplification in optical amplifier is (col. 3, lines 62-64).

Amplifier 15 comprises an optical fiber which, when pumped by light beams at the proper wavelength, produces gain for transmitted signals within the amplifications bandwidth of the amplifier (col. 4, lines 4-13). Also, col. 3 lines 37-61 of *Giles et al.* refers to employing fault tolerance procedures in which measures are taken to power lasers at lower output power to extend their lifetime.

While *Giles et al.* may refer to operating amplifiers within their amplification bandwidth, that reference is not seen to teach or suggest pumps operating so that those amplifiers operate *within a saturation mode*, wherein a saturation level of each amplifier is either substantially the same, or different, as set forth in Claim 47.

Accordingly, even if the pumps and coupler of *Giles et al.* were incorporated into the *Cowle et al.* system, the result still would not provide those features relating to amplifiers operating in a saturation mode. Moreover, because *Cowle et al.* teaches power equalization amplifiers designed to operate in their saturation regime “so that the output signal power is determined by the pump power and is substantially independent of the input powers” (col. 2, lines 13-16), incorporation of pumps of *Giles et al.* which do not cause amplifiers to operate in a saturation mode would render *Cowle et al.* unsuitable for its intended purpose. Because it is well established that, “[i]f proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification”, MPEP § 2143.01 (citation omitted), and such a suggestion or motivation must exist in order to establish a *prima facie* case of obviousness, MPEP § 2143, it is respectfully submitted that the Office Action has

failed to establish a *prima facie* case of obviousness against Claim 47.

For all the above reasons, Claim 47 is believed to be clearly patentable over *Cowle et al.* and *Giles et al.*, whether considered separately or in combination.

If the Examiner refuses to remove the outstanding rejection of Claim 47, she is respectfully requested to explain why that result is justified when the Patent Office has, in contrast, allowed at least two claims (Claims 30 and 32 of parent Application No. 09/461,052, now Claims 6 and 14 of U.S. Patent 6,735,394 B1) that recite patentable features relating to selectively coupling an output of plural pumps to at least one optical amplifier through a coupler, wherein the amplifier operates in a saturation mode.

Independent Claims 51 recites features similar in many relevant respects to those of Claim 47 discussed above, and also is believed to be patentable over *Cowle et al.* and *Giles et al.*, whether considered separately or in combination, for the same reasons as is Claim 47.

Independent Claim 60 has been amended to incorporate the features of Claim 62, which was not rejected over *Cowle et al.* in view of *Giles et al.* As amended Claim 60 recites:

60. An optical node, comprising:  
a plurality of optical amplifiers arranged to influence a power level of each of a plurality of optical channels; and  
a controller, arranged to selectively control the power level of each optical amplifier so that each optical amplifier operates in a saturation mode,

wherein the optical amplifiers are arranged in subsets, and the controller couples at least a portion of power output from each of a plurality of pump sources to each optical amplifier within a same subset.

The foregoing amendment has been made without conceding the propriety of the Section 103(a) rejection of Claim 60, and merely with the intention of obtaining early allowance of the claim.

It is respectfully submitted that neither *Cowle et al.* nor *Giles et al.* teaches or suggests the above-underlined features of Claim 60, and thus Claim 60 is believed to be clearly patentable over those references, whether considered separately or in combination.

Independent Claim 56, as amended, is a method claim corresponding to Claim 60, and also is believed to be clearly patentable over *Cowle et al.* and *Giles et al.* for the same reasons as is Claim 60.

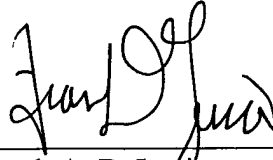
The other claims in this application are each dependent from the independent claims discussed above, and also are believed to be patentable over the art relied on in the Office Action, at least for the reason that each depends from a patentable base claim. Nonetheless, individual reconsideration of each dependent claims is respectfully solicited.

In view of the above amendments and remarks, the application is believed to be in allowable form. Therefore, favorable reconsideration and early passage to issue are respectfully solicited. If the Examiner believes that additional issues remain outstanding, the Examiner is respectfully requested to contact the undersigned attorney.



Applicants' undersigned attorney may be reached in our New York office by telephone at (212) 218-2100. All correspondence should continue to be directed to our below listed address.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Frank A. DeLucia", written over a horizontal line.

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